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Control system for a motor vehicle

The invention relates to a control system for a motor vehicle according to the preamble of patent claim 1.

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In modern vehicles, multimedia control systems are being increasingly used. An example of this is the command system in the Mercedes Benz S-class.

15 DE 197 52 056 A1 describes a control system of the generic type, in particular for a motor vehicle. In this control system, two display areas are displayed on a screen display in a menu structure with a plurality of menu levels. A first display area is arranged as a
20 frame around the second display area. In a first menu level, eight fields with entries which correspond to applications which can be carried out and which are arranged vertically and horizontally are displayed in the first display area. An entry is selected by means
25 of a pushing or tilting movement of the manual actuating means with a plurality of degrees of freedom of adjustment in the direction of the position of the corresponding entry in the first display area. A selected entry is activated by pressing the manual
30 actuating means. After the activation, a plurality of vertically arranged entries which are assigned to the activated entry in the first menu level are displayed in a second menu level in the second display area. The entries displayed in the second display area are
35 selected by means of rotational movement of the manual actuating means and activated by pressing the manual actuating means. The activated second display area and the second menu level are exited by means of the

pushing or tilting movement of the manual actuating means in the direction of a position of one of the entries in the first display area. The control system is then located in the first menu level in the first
5 display area again.

The object of the invention is to specify an improved control system for a motor vehicle which permits intuitive control and which reduces the scope of
10 distracting information.

The invention achieves this object by making available a control system having the features of Patent Claim 1.

15 Advantageous developments of the invention are specified in the dependent claims.

The invention is based on the idea that in an active display area in at least one level of the menu structure at least two entries are assigned to a
20 settable parameter for setting with the manual actuating means, a first entry being an analog display of the settable parameter, and a second entry being a digital display of the settable parameter.

25 As a result it is possible for the user to consider, in accordance with his preference when setting a parameter, either the associated digital or analog display on a screen display without having to make
30 further settings.

In order to set the at least one parameter it is possible to use, for example, four degrees of freedom of adjustment of the manual actuating means, it being
35 possible to increase the value of the parameter by means of a first degree of freedom of adjustment which corresponds, for example, to pushing the manual actuating means in the positive y direction, or by

means of a third degree of freedom of adjustment which corresponds, for example, to rotating the manual actuating means in the clockwise direction about a z axis, and it being possible to decrease the value of the parameter by means of a second degree of freedom of adjustment which corresponds, for example, to pushing the manual actuating means in the negative y direction or by means of a fourth degree of freedom of adjustment which corresponds, for example, to rotating the manual actuating means in the counterclockwise direction about a z axis.

The setting which is performed for the at least one parameter can be stored, for example, by actuating the actuating means with a fifth degree of freedom of adjustment, as a result of which in addition the active display area can be exited and closed. The fifth degree of freedom of adjustment corresponds, for example, to pushing the manual actuating means in the negative z direction.

In one refinement, at least one of the degrees of freedom of adjustment corresponds to the orientation of the parameter which is displayed in one of the entries.

In addition, the settable parameter can comprise a plurality of settable subparameters, one of which can be selected in each case by actuating the manual actuating means with a sixth or seventh degree of freedom of adjustment, the sixth degree of freedom of adjustment corresponding, for example, to pushing the manual actuating means in the positive x direction, and the seventh degree of freedom of adjustment corresponding, for example, to pushing the manual actuating means in the negative x direction.

The subparameter which is selected for the purpose of setting can be visually highlighted by means of a changed graphic display.

- 5 In a possible refinement, the at least one parameter represents a time, a first subparameter representing, for example, the hours, a second subparameter representing the minutes and a third subparameter representing the seconds.

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Advantageous configurations of the invention are displayed in the drawings and are described below.

In the drawings:

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- Fig. 1 is a block circuit diagram of a control system for a motor vehicle;
Fig. 2 is a schematic illustration of a screen display from Fig. 1 in a first menu level;
20 Fig. 3 is a schematic illustration of a display region of the screen display from Fig. 1 in a further menu level; and

As is apparent from Fig. 1, the control system 1 for a
25 motor vehicle comprises a screen display 2, a manual actuating means 3, a control and evaluation unit 4 and a plurality of vehicle systems such as a navigation system, a heating system and an air conditioning system, a cellular telephone, a video system, an audio
30 system etc. which are illustrated combined as one element 5. The vehicle systems transmit signals to the evaluation and control unit 4 from which the control and evaluation unit 4 determines current system states. All the applications and/or functions and/or
35 subfunctions and/or options and/or status displays in various menu levels of a menu structure are controlled by means of the manual actuating means 3. The latter has seven degrees of freedom of adjustment for

selecting and/or activating entries displayed in an active display area. Said actuating means 3 can be pushed in four directions according to the arrow illustration in Fig. 1, i.e. in a positive x direction, a negative x direction, in a positive y direction or in a negative y direction. In addition, it can be rotated in the clockwise direction or in the counter clockwise direction about a z axis (not illustrated) which is perpendicular to the plane of the drawing, and can be pressed in the direction of the negative z direction, i.e. into the plane of the drawing.

Rotating the manual actuating means 3 in the clockwise direction causes a cursor on the screen 2 to move to the right or downward as a function of a horizontal or vertical orientation of the entries displayed on the screen display 2, and turning in the counter clockwise direction causes the cursor to move to the left or upward. Pushing the manual actuating means 3 in Fig. 1 upward, i.e. forward in the direction of the windshield, i.e. in the positive y direction, causes the cursor on the screen display 2 to move upward, and the pushing process in the downward direction in Fig. 1, i.e. toward the rear in the negative y direction, causes the cursor on the screen display 2 to move downward. Pushing to the right, i.e. in the positive x direction, causes the cursor on the screen display 2 to move to the right, and pushing to the left, i.e. in the negative x direction, causes the cursor to move to the left.

The selection and/or activation of an entry displayed on the screen display 2 are carried out by pushing or turning the manual actuating means 3. In a way which is redundant with respect to the vertical pushing along an axis, i.e. with respect to the pushing in the y direction or with respect to the horizontal pushing along an axis, i.e. with respect to the pushing in the

x direction, the manual actuating means 3 can be rotated about the z axis. The pushing direction in order to select an entry corresponds here for example to the orientation of the entries displayed in the active display area. The pushing direction which is respectively orthogonal with respect to the selection pushing direction causes the active display area to be exited. In addition, in order to activate a selected entry it may be necessary to press the manual actuating means 3.

As is clear from Fig. 2, the screen display 2 comprises, in a first menu level, a graphic basic structure of five vertically arranged, horizontal display areas 210 to 250. This graphic basis structure is constant over the multiplicity of various menu levels of the menu structure. The screen display 2 is configured, for example, as an eight inch screen with a ratio of the sides of 15:9. The graphic basic structure of at least a first of the display areas 210 to 250 of the screen display 2 is constant over the multiplicity of various menu levels of the menu structure. In Fig. 2, the display areas 210, 220, 240 and 250 are configured as such first display areas.

The graphic basis structure of at least a second of the display areas 210 to 250 is variable over the multiplicity of various menu levels of the menu structure as a function of an activated application and/or function and/or subfunction and/or option and/or status display. In Fig. 2, the display area 230 is configured as such as second display area. This central display area 230 may be configured graphically in very different ways.

One or more horizontally arranged entries 1.1 to 5.7 may be respectively displayed in the four display areas 210, 220, 240 and 250 which are configured as first

display areas. For example, the display areas 210, 220, 240 and 250 in Fig. 2 in the first menu level each comprise a different number of entries. For example, the first display area 210 comprises one entry 1.1, the
5 second display area 220 comprises five entries 2.1 to 2.5, the fourth display area comprises no entry and the fifth display area comprises seven entries 5.1 to 5.7. In Fig. 2, the first display area 210 is activated and the hatched entry 1.1. is selected. The hatched display
10 is intended to indicate that the cursor is positioned on the entry 1.1.

The entries 1.1 to 5.7 of the display areas 210 to 250 displayed on the screen display 2 can be arranged
15 according to the importance of their contents or their frequency of application. When the entries 1.1 to 5.7 are arranged vertically, the width of the individual fields for displaying said entries is dependent, for example, on the length of the longest entry. The field
20 width may be additionally or alternatively dependent on the number of fields in a display area.

Fig. 3 shows the screen display 2 in a further menu level after an application time has been selected and
25 activated in the second display area 220, and an option 1 from a submenu list 230.1 has been selected and activated in the display area 230. A further display area 230.2 is activated in order to set the parameter assigned to the option 1. In the illustrated exemplary
30 embodiment, the submenu list 230.1 comprises four entries 3.1 to 3.4 which each comprise an option and a setting assigned to the respective option. The first entry 3.1 comprises the option 1 and the setting 1, the second entry comprises the option 2 and the setting 2
35 etc. The first entry serves, for example, for setting the time, and the setting 1 shows the current time. The second entry 3.2 serves, for example, for setting a starting time for a stationary-mode heater, and the

setting 2 shows the instantaneously set starting time for the stationary-mode heater. The third entry 3.3 serves for example, for setting a stop time for the stationary-mode heater, and the setting 3 shows the
5 instantaneously set stop time for the stationary-mode heater. The fourth entry 3.4 serves, for example, for setting a time for a memory function, and the setting 4 shows the instantaneously set time for the memory function.

10 In order to set the entries 3.1 to 3.4, the display area 230.2 is activated and opened after one of the entries 3.1 to 3.4 has been activated.

In fig. 3, the entry 3.1 has been selected and
15 activated by correspondingly actuating the manual actuating means 3, as a result of which the display area 230.2 is activated and opened. The display area 230.2 comprises two entries, a first entry 3.6 of which is configured as a digital display of the settable
20 parameter, and a second entry 3.7 of which is configured as a digital display of the settable parameter. Before the parameter is set with the manual actuating means 3, the currently stored value of the settable parameter is displayed, said value also being
25 displayed in the corresponding entry 3.1 to 3.4 of the submenu list 230.1.

For the purpose of better orientation it is possible to display the possible degrees of freedom of adjustment
30 of the manual actuating means 3 by means of corresponding arrows 231 to 236. The arrow 232 shows a possible actuation with a first degree of freedom of adjustment in the positive y direction, said actuation permitting the value of the settable parameter to be
35 increased. The arrow 234 shows a possible actuation with a second degree of freedom of adjustment in the negative y direction, said actuation permitting the value of the settable parameter to be decreased. The

arrow 236 shows a possible actuation with a third degree of freedom of adjustment, which corresponds to a rotation of the manual actuating means 3 about the z axis in the clockwise direction, said actuation
5 permitting the value of the adjustable parameter to be increased. The arrow 235 shows a possible actuation with a fourth degree of freedom of adjustment which corresponds to a rotation of the manual actuating means 3 about the z axis in the counterclockwise direction,
10 said actuation permitting the value of the settable parameter to be decreased. The arrow 232 shows a possible actuation with a sixth degree of freedom of adjustment in the positive x direction. By means of this actuation it is possible to change from a
15 currently settable subparameter, here the hours, to another subparameter, here the minutes. Actuation in the direction of the arrow 231 which is represented by dashed lines is not possible at this time since no further subparameter is arranged in this direction from
20 the currently settable subparameter. Correspondingly, movement of the manual actuating means 3 in this direction can be blocked. The arrow 231 may, for example, be completely removed from the display or displayed with a weaker intensity or a weaker contrast.
25 Usually there is a display of when the minute subparameter is activated by corresponding actuation of the manual actuating means 3. If the minutes subparameter is activated, the arrow 233 is displayed with a weaker intensity or a weaker contrast or
30 completely removed from the display, in which case the actuation of the manual actuating means 3 in the negative x direction can then also be blocked.

In the analog entry 3.5, the minute indicator is
35 displayed by dashes and the hour indicator which can be set at this time is displayed in a highlighted fashion, i.e. the minute indicator can be displayed with a weaker intensity or a weaker contrast or removed from

the display completely. When there is a changeover to the minute subparameter, the hour indicator is displayed with a weaker intensity or a weaker contrast or removed from the display completely.

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The exiting of the active display area 230.2 is brought about by pressing the manual actuating means 3. After a parameter setting has been performed, the currently set parameter value is stored and the activated display area 230.2 exited by pressing the manual actuating means 3. The setting in the associated entry 3.1 to 3.4 now displays the newly set and stored value.

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The inventive simultaneous displaying of an analog and a digital representation of a settable parameter enables the user to view the display which corresponds to his preference when setting the parameter.

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As a result of the control system according to the invention, the control processes are simplified for the user and the cognitive load is reduced so that the user can concentrate better on the events on the road.

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